

## ABSTRACT

An antenna apparatus includes a minute loop antenna and at least one antenna element. The minute loop antenna is provided to be electromagnetically close to a dielectric substrate including a grounding conductor, has a predetermined number  $N$  of turns and a predetermined minute length, operates as a magnetic ideal dipole when a predetermined metal plate is located closely to the antenna apparatus, and operates as a current antenna when the metal plate is located apart from the antenna apparatus. The antenna element is connected to the minute loop antenna, and operates as a current antenna. In the antenna apparatus, one end of the antenna apparatus is connected to a feeding point, and another end of the antenna apparatus is connected to the grounding conductor of the dielectric substrate.